REMARKS

Claims 1-21 remain pending in the application. Claims 1, 4, 7, 14, and 21 have been amended without introduction of new matter. Favorable reconsideration is respectfully requested in view of the above amendments and the following remarks.

The courtesy extended by the Examiner to Applicants' representative in a telephonic interview conducted on July 19, 2006 is noted with appreciation. In that interview, the parties discussed proposed amendments that would help to overcome the rejection of claims 4-17 under 35 U.S.C. § 112, first paragraph. That amendment is discussed further below.

The Examiner also clarified, in the telephonic interview, that claims 18-20 (which are not mentioned in the Final Office Action) stand rejected under 35 U.S.C. §112, first paragraph by virtue of their dependence from claims 4, 7, and 14, respectively. The Examiner also stated that claim 21 (also not mentioned in the Final Office Action) was objected to because of its dependence from a rejected claim (i.e., claim 1), but that it would be allowable if rewritten to include all of the limitations of the base claim and any intervening claims. Accordingly, claim 21 has been so amended, and is now believed to be in condition for allowance.

Claims 4-17 (as well as claims 18-20) again stand rejected under 35 U.S.C. §112, first paragraph, as allegedly failing to comply with the enablement requirement. In particular, the Office alleges that the application is non-enabling with respect to the claimed "determining the set of complex channel estimates based on the phase offset and the first set of channel estimates." This rejection is respectfully traversed.

"The test of enablement is whether one reasonably skilled in the art could make or use the invention from the disclosures in the patent coupled with information known in the art without undue experimentation." *United States v. Telectronics, Inc.*, 857 F.2d 778, 785, 8 USPQ2d 1217, 1223 (Fed. Cir. 1988). It is also well settled that "A patent need not teach, and preferably omits, what is well known in the art." *In re Buchner*, 929 F.2d 660, 661, 18 USPQ2d 1331, 1332 (Fed. Cir. 1991); *Hybritech, Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1384, 231 USPQ 81, 94 (Fed. Cir. 1986), cert. denied, 480 U.S. 947 (1987); and *Lindemann Maschinenfabrik GMBH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 1463, 221 USPQ 481, 489 (Fed. Cir. 1984).

In the present instance, Applicants' specification easily satisfies this standard. As taught in Applicants' specification, the conventional solution to the problem of determining complex values that represent an estimate of the channel is to use the pilot signals transmitted

on a channel. See Specification page 7, line 29 through page 8, line 4. In communication systems such as Wideband Code Division Multiple Access (WCDMA), it is desired to determine a complex channel estimate of the Dedicated Physical Channel (DPCH). However, this channel usually experiences more noise than the Common Pilot Channel (CPICH), and therefore has a higher Signal-to-Interference-Ratio (SIR) than the CPICH.

The application, therefore, explains that it would be advantageous to use information measured on the CPICH to derive an estimate of the DPCH. One can consider doing this because the CPICH and DPCH are both transmitted from the same base station antenna(s) (see, e.g., FIG. 3), and are therefore subject to the same environment that can, for example, cause multipath effects. Consequently, channel estimates based on the CPICH and DPCH are both useful for providing a good estimate of the channel coefficients. (See, e.g., the specification at page 15, lines 9-12; and at page 19, lines 28-29.)

But, as explained in the application at, for example, page 11, line 4 through page 13, line 3, the CPICH can have any of four possible phase offsets relative to the DPCH, and the particular phase offset at any given instant is generally unknown to the receiver. (See, e.g., specification at page 12, lines 20-21.) It is desired to use a channel estimate based on the CPICH because this estimate can be more accurate than one based on the DPCH, and more accurate channel estimates in turn improve the accuracy of the maximum ratio rake combining to be performed and the accuracy of the eventual detected symbols. (See specification at page 15, lines 1-6.) *Thus, the problem presented is how to determine the phase offset between the CPICH and the DPCH so that the channel estimate of the CPICH can be adjusted and used for maximum ratio combining of the DPCH.* (See, e.g., specification at page 15, lines 14-16; and lines 21-22.)

The specification describes the solution. At page 15, lines 23-30, the second antenna channels for CPICH and DPCH, represented by the subscripts 2c and 2d, are presented as:

$$h_{2c}^{i} = a_i e^{j\alpha i} \tag{3}$$

$$h_{2d}^{i} = b_i e^{j\beta i} \tag{4}$$

respectively, where $i \in [1, n]$ is the rake finger number, a and b are the respective channel gains, and α and β are the respective antenna phases.

Equation (7), which appears on page 16 of the specification, shows how the respective antenna phases, α and β, are related to one another by an offset value, φ.

One of ordinary skill in the art at the time of the invention would have readily recognized that if one of the channel estimates (e.g., the CPICH channel estimate) were known and if the phase offset value between the two channel estimates were known, then the other channel estimate (e.g., the DPCH channel estimate) can be approximated by rotating the known channel estimate based on the phase offset value.

To that end, the specification then goes on to derive the true phase difference between the CPICH and the DPCH (see Equation (14) at page 18, line 1). If it is assumed that the CPICH and DPCH are independent (a valid assumption in many communication systems including 3GPP), equation (14) can be rewritten as the simpler (see page 19, line 1):

$$\min_{\varphi \in \{\pi/4, 3\pi/4, 5\pi/4, 7\pi/4\}} \sum_{i=1}^{n} \frac{\left(\hat{\alpha}_i - \hat{\beta}_i + \varphi\right)^2}{\sigma_{ei}^2} \qquad (16)$$

where:

$i \in [1, n]$ is a rake finger number of the receiver, and

$\hat{\alpha}_i$ and $\hat{\beta}_i$ are the respective first and second antenna phase estimates derived for rake finger i from the first and second sets of channel estimates, and

σ_{ei}^2 is related to the power of interference.

At page 19, lines 28-29, the specification explains that, since the CPICH and DPCH are transmitted through the same physical medium, they experience the same multipath and differ by the phase offset. Accordingly, as stated at page 20, lines 21-23, "*[t]he channel estimates* to be used for combining *are calculated* 650, *by compensating* the CPICH channel estimates *with the estimated phase*." (Emphasis added.) One of ordinary skill in the art at the time the invention was made would readily understand that, in this instance, "compensating … with the estimated phase" means rotating the CPICH channel estimates by the phase offset value just calculated. Once the CPICH channel estimates are rotated, they may be used in the maximum ratio combining process that is applied to the outputs of the rake fingers, as described at page 15, lines 1-6.

In order to emphasize this aspect of the invention, and as discussed with the Examiner in the above-referenced telephonic interview, the last paragraph of independent claim 4 has been amended to define "determining the set of complex channel estimates *by compensating the first set of channel estimates based on the phase offset value*" (emphasis added). As mentioned above, the "compensating …" language appears in the specification at page 20,

lines 21-23, and is therefore fully supported by the original specification. It is believed that this amendment addresses the Office's concern that "Applicant's argument with respect to the 112 first paragraph rejection to claims 4-17 does not address how the complex channel is estimated from the 'phase offset' and 'the first set of channel estimates.'" (See numbered paragraph 8 of the Final Office Action.)

Independent claims 7 and 14 have been similarly amended, without introduction of new matter.

In view of the foregoing, it is respectfully asserted that the specification is enabling with respect to amended claims 4-20. Accordingly, it is respectfully requested that the rejection of claims 4-17 (and implicitly claims 18-20) under 35 U.S.C. §112, first paragraph, be withdrawn.

Claims 1-3 again stand rejected under 35 U.S.C. §102(e) as allegedly being anticipated by Salonen et al. (US 6,611,675). This rejection is respectfully traversed.

Independent claim 1 has been amended to now define, *inter alia*, "deriving first and second antenna phase estimates from the first and second sets of channel estimates, respectively; and determining an estimate of the phase offset based on the set of first and second antenna phase estimates <u>without using the first and second sets of channel estimates</u>." (Emphasis added.) Support for "deriving first and second antenna phase estimates from the first and second sets of channel estimates, respectively" may be found in, for example, the specification text spanning pages 15 and 16. Support for "determining an estimate of the phase offset based on the first and second antenna phase estimates <u>without using the first and second sets of channel estimates</u>" (emphasis added) may be found, for example, in the various embodiments represented by Equations (14) and (16), which are found on respective pages 18 and 19 of the specification. It is evident from each of these equations that the phase offset is determined from the antenna phase estimates, $\hat{\alpha}_i$ and $\hat{\beta}_i$, without using the complete first and second channel estimates (e.g., h_{2c}^i and h_{2d}^i as shown in Equations (3) and (4) on page 15).

The technique taught by Salonen et al. does not anticipate Applicants' claim 1 at least because the Salonen et al. technique does not involve "determining an estimate of the phase offset based on the first and second antenna phase estimates <u>without using the first and second sets of channel estimates</u>" (emphasis added) as now defined by Applicants' claims. Rather, Salonen et al., at column 2, lines 18-45; and at column 2, line 56 through column 3,

lines 23, disclose two embodiments, each of which utilizes a complete channel estimate for determining the phase offset value. For example, in Salonen et al., "All four possible phase shifts $\{\pi/4, 3\pi/4, -\pi/4, -\pi/4\}$ [sic: $\{\pi/4, 3\pi/4, -\pi/4, -3\pi/4\}$] are investigated and the phase shift that results in the smallest distance metric is selected as the most probable phase shift." (See Salonen et al. at column 4, lines 27-30.) Accordingly, Salonen et al. at column 4, lines 49-53 describe "examining the phase difference between the dedicated pilot channel estimate and the rotated common pilot channel estimate, and accepting the result if the phase difference is less than some threshold value" (emphasis added). Nowhere do Salonen et al. disclose deriving first and second antenna phase estimates from the channel estimates, and then using these first and second antenna phase estimates as the basis for determining an estimate of the phase offset without using the first and second sets of channel estimates.

For at least the foregoing reasons, independent claim 1 and its related claims 2-3 are believed to be patentably distinguishable over the Salonen et al. patent. Therefore, it is respectfully requested that the rejection of claims 1-3 under 35 U.S.C. §102(e) be withdrawn.

The application is believed to be in condition for allowance. Prompt notice of same is respectfully requested.

Respectfully submitted,
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